

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service



A COMPARATIVE
STUDY OF
40 Nursing Homes

THEIR DESIGN AND USE

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

HOSPITAL AND MEDICAL FACILITIES SERIES
(Under the Hill-Burton Program)

design
equipment

A COMPARATIVE
STUDY OF
40 Nursing Homes
THEIR DESIGN AND USE

By: A. Rorke Vanston, Architect
Architectural and Engineering Branch

Leslie M. Abbe, Assistant Chief
Program Evaluation and Reports Branch

Maury Hampton, Health Program Analyst
Program Evaluation and Reports Branch
*(now with Dental Public Health
and Resources)*

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
Division of Hospital and Medical Facilities
Washington, D.C. 20201

Public Health Service Publication No. 930-D-17

March 1965

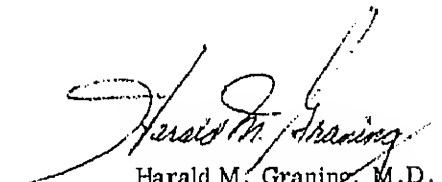
For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price 25 cents

FOREWORD

In the last decade national attention has been focused on the care of aged and chronically ill patients. State and local public agencies have established and administered licensing laws governing nursing homes, and Federal financial support has been made available for building additional nursing homes in local communities. Recommendations by the 1958 National Conference on Nursing Homes and Homes for the Aged pointed the way for increased progress in this field. These happenings have resulted in a substantial increase in the number of nursing homes throughout the Nation as well as an improvement in the services and quality of care provided.

To study the characteristics of nursing homes constructed with Hill-Burton assistance as well as those constructed without such assistance, a survey of 40 nursing homes was made by the Division of Hospital and Medical Facilities of the Public Health Service in cooperation with the American Nursing Home Association. The areas of interest were the general operating features of the homes, the general nonclinical characteristics of the patients, architectural design, construction and cost data, and an evaluation of the physical facilities in relation to the care provided. This publication summarizes the findings of that survey.

Special appreciation is given to Mr. Alfred S. Ercolano, Executive Director of the American Nursing Home Association, for his assistance and to the staffs of the nursing homes visited for the many courtesies extended during the survey.



Harold M. Graning, M.D.
Assistant Surgeon General
Chief, Division of Hospital
and Medical Facilities

CONTENTS

	<u>Page</u>
FOREWORD	iii
INTRODUCTION	1
GENERAL PROFILE	3
Description of homes	3
Staffing	3
PATIENT CHARACTERISTICS	6
Age and sex	6
Degree of mobility	6
Mentally confused or incontinent	7
Bedfast patients vs. available unit space	7
Bedfast patients vs. therapy services	8
ARCHITECTURAL CHARACTERISTICS	8
Introduction.	8
Design concept in nursing homes	8
Basic factors which affect planning	8
Exterior design and site	9
Construction features	9
Interior environment and finishes	9
Use of space	10
Arrangement of space	14
Effect of operational changes on planning	14
Fixtures and equipment	16
Comments by staff members	19
CONSTRUCTION COSTS	19
Cost per bed	20
Cost per square foot	20
Relationship of unit costs	23
Other cost factors	24
Assessment of cost findings	25
SUMMARY	25

TABLES

<u>No.</u>	<u>Page</u>
1. General description of homes surveyed	2
2. Size and occupancy of homes surveyed	3
3. Distribution of personnel in 40 nursing homes	5
4. Median level of staffing	6
5. Nonclinical characteristics of patients in 40 nursing homes	7
6. Distribution of homes and beds by capacity of patient rooms	11
7. Summary of unit areas and construction costs per square foot and per bed	23
8. Unit costs per square foot and per bed for homes of comparable unit area per bed	24

CHARTS

1. Bedfast patients vs. total unit area	12
2. Bedfast patients vs. dining, recreation, and occupational therapy area per bed	12
3. Dining, recreation, and occupational therapy area per bed vs. total unit area per bed	13
4. Average area per bed in patient rooms vs. total unit area per bed	13
5. Cost per bed vs. total unit area per bed	21
6. Cost per bed vs. average area per bed in patient rooms	21
7. Cost per square foot vs. total unit area per bed	22
8. Plumbing fixture units per bed vs. total unit area per bed	22

INTRODUCTION

Nursing homes have developed rapidly during the last 20 years as a new factor in the social structure of our time. They are now an important health facility in providing care for the chronically ill and aging. Within the last decade, the services and quality of care provided have been greatly improved through many private and public efforts.

The American Nursing Home Association and its members are among those groups providing leadership in improving the character and quality of nursing home facilities. All States now have licensure requirements which are basically designed to eliminate unsafe conditions and assist in ensuring adequate facilities.

At the Federal level, financial support for the construction of additional nursing home facilities is provided through several programs. The Hospital and Medical Facilities Construction program (Hill-Burton) in the Public Health Service, makes direct grants available on a matching basis to public and other nonprofit sponsors in constructing and equipping nursing homes. The Small Business Administration provides commercial loans to privately owned convalescent and nursing homes for the construction of new facilities or expansion of existing facilities. Mortgage insurance to facilitate the construction or rehabilitation of qualified proprietary nursing homes is provided by the Federal Housing Administration. Construction guides and regulations on facilities receiving Federal assistance have promoted sound design for adequate care of the patient.

An important step in appraisal and stock-taking for the future occurred early in 1958 when representatives from many fields attended the National Conference on Nursing Homes and Homes for the Aged called by the Public Health Service. Their recommendations pointed the way to much further progress in this area.

To gain a current insight into these changing developments and to reappraise working standards, a survey at the operating level was undertaken on a limited scale in 1961-62. This survey was conducted by the Division of Hospital and Medical Facilities of the Public Health Service with the cooperation of the American Nursing Home Association.

The specific aims of the survey were:

1. To identify the general operating features of the homes surveyed with respect to such matters as size, ownership, occupancy level, typical stay, and number and training of staff, including professional services provided.
2. To determine general nonclinical characteristics of the patients receiving care at the time of visit, including age, sex, degree of mobility, and other limiting physical conditions.
3. To study the architectural design of the homes surveyed as to their type of construction and present use and functional arrangement of the areas provided.
4. To obtain data on construction procedures and actual or estimated costs of homes surveyed.
5. To appraise the effectiveness and adequacy of the physical facilities in providing care to the fullest practical degree for the nursing, therapeutic, and social needs of the patients.
6. To evaluate the pertinent standards established by Federal regulations relating to space requirements for nursing homes.

The extent of the study was limited by the funds and staff available. Forty homes of varied ownership, size, and location were selected for study. The American Nursing Home Association suggested 20 homes with a wide geographic distribution, all originally proprietary in ownership; one nonprofit home was substituted later. To match these, the Public Health Service designated 20 other homes built with Federal assistance under the Hill-Burton program from the limited number which were then available with an operating period of one year. These were comparable in size and location, and were either publicly owned or voluntary nonprofit. The diversified character and location of the nursing homes studied provide a useful index of current practice, but the limited sampling should be recognized in evaluating any conclusions.

Table 1. GENERAL DESCRIPTION OF HOMES SURVEYED

Home number	Owner-ship ^{a/}	Beds (No.)	Patients on date of visit			Discharges (Latest 12-mo. period)			Personnel	
			Patients (No.)	Occu-pancy rate (%)	Median length of stay (mos.)	Dis-charges (No.)	Median length of stay (mos.)	Deaths (%)	Full-time equiv.	Rate per 100 beds
Total 40 homes		2,434	2,199	96 ^{b/}	12.5	3,387	2.0	25 ^{b/}	1,340.0	52 ^{b/}
Far West										
1 ^{c/}	CH	48	41	85	^{d/}	1,073	^{d/}	4	34.0	71
2 ^{c/}	NPA	28	18	64	10.5	112	^{d/}	15	27.5	98
3	CH	106	100	94	22.5	100	2.0	41	45.5	43
21	PROP	50	48	96	3.0	87	1.0	63	23.0	46
22	PROP	53	43	81	4.0	146	1.0	29	31.5	59
23	PROP	83	83	100	12.0	131	3.0	30	36.0	43
Northwest										
4	NPA	50	49	98	20.0	34	8.5	50	25.0	50
5	CH	74	73	99	36.0	14	16.5	64	30.0	41
6	CH	27	26	96	19.0	12	12.0	50	13.0	48
7	CH	58	58	100	19.0	25	12.0	72	30.5	53
24	PROP	82	81	99	7.0	108	1.0	19	43.0	53
25	PROP	51	50	98	20.0	27	14.0	78	23.0	45
Southwest										
8 ^{c/}	PUB	39	34	87	21.0	8	15.5	75	16.0	41
9	CH	45	43	96	14.0	14	1.5	21	25.5	57
10	NPA	40	33	83	6.0	28	2.0	25	17.0	43
11	NPA	38	32	84	23.5	17	19.0	59	19.5	51
26	NPA	122	110	90	26.5	86	3.5	55	84.0	69
27	PROP	26	25	96	10.0	42	1.0	26	8.5	33
28	PROP	69	66	96	7.0	91	1.0	38	41.5	60
29	PROP	38	35	92	34.0	8	23.5	13	18.5	49
Southeast										
12 ^{c/}	PUB	32	32	100	25.5	11	18.0	64	17.5	55
13 ^{c/}	NPA	50	46	92	11.5	61	1.0	28	45.5	91
14	PUB	76	74	97	20.0	43	5.0	53	38.0	50
15 ^{c/}	PUB	56	56	100	11.0	45	2.0	47	38.5	69
16	NPA	30	19	63	21.0	9	3.0	22	20.5	68
30	PROP	72	44	61	15.0	47	2.0	34	29.0	40
Middle States										
17 ^{c/}	NPA	40	40	100	11.0	53	2.0	25	21.5	54
18	PUB	141	121	86	24.0	78	2.0	51	107.0	76
19 ^{c/}	PUB	29	27	93	5.0	54	1.0	22	20.5	71
31	PROP	130	100	77	11.0	52	2.0	33	45.5	35
32	PROP	72	70	97	10.5	75	3.0	52	37.5	52
33	PROP	49	37	76	15.0	49	2.0	20	24.0	49
34	PROP	35	35	100	13.0	21	4.0	19	22.5	64
35	PROP	53	53	100	12.0	48	5.0	17	20.5	39
36	PROP	67	67	100	24.0	36	10.0	61	27.0	40
Northeast										
20	PUB	50	48	96	19.0	55	2.0	25	42.5	85
37	PROP	58	57	98	5.0	106	1.0	32	42.0	72
38	PROP	131	102	78	7.0	260	2.0	23	78.0	60
39	PROP	107	94	88	7.0	90	1.0	18	53.5	50
40	PROP	29	29	100	8.0	31	1.0	19	16.5	57

^{a/} Ownership: CH, church; NPA, nonprofit agency; PROP, proprietary; PUB, public.

^{b/} Median.

^{c/} Hospital operated nursing homes.

^{d/} Stay less than one month.

GENERAL PROFILE

Description of Homes

The nursing homes selected for the study included the three broad classifications of ownership: proprietary, voluntary nonprofit, and publicly owned. The homes were located in 21 States, representing all parts of the country. Each of the six major socioeconomic regions had from 5 to 9 homes (table 1). Of the 40 homes, 19 were privately owned by individuals and corporations organized for profit; 14 were voluntary nonprofit homes owned and operated or related to churches and other nonprofit groups; the remaining 7 homes were owned and operated by State, county, or city governments.

There was little difference in median size by ownership, as shown in table 2. The homes studied include a total of 2,434 beds. The occupancy rate was generally high, with a median rate of 96 percent. Only 6 homes, or 15 percent, had an occupancy rate below 80 percent.

The median stay for resident patients ranged from less than 1 month to 36 months in the various homes with a central concentration of frequency of about 12 months. The practical consequence of this is to reduce substantially the net capacity to admit new patients. Data were collected on all discharges from each of the homes for the previous 12 months. These data reflected a limited volume of discharges as shown in table 1.

Discharge information, although infrequently obtained, provides a basis for comparing length of stay of discharged persons with that of resident patients. The median stay of persons previously discharged was found to be much shorter than that of patients in the home on date of visit. Where an occasional instance of longer median stay was shown on discharge records, it appeared related to a median stay exceeding 18 months. These findings are significant in their relationship to bed need and the tendency in some homes to provide more extended periods of care.

Table 2. SIZE AND OCCUPANCY OF HOMES SURVEYED

Type of Ownership	Number of Homes	No. of Beds		Occupancy Rate (%)
		Total	Median	Median
All types	40	2,434	51	96
Proprietary	19	1,255	58	97
Voluntary nonprofit	14	756	47	93
Public	7	423	50	93

Staffing

The number on the staff and the extent of their training and experience are significant in relation to the amount of attention and kind of care that might be expected in a nursing home. Attention and care may also be influenced by other factors that are not easily measured. However, the most important aspect of care is that rendered by the nursing staff. The extent to which nursing care is available to the patient is affected by the ratio of personnel to patient population, and the level of formal training attained by the staff influences the direction the care will take.

The analysis of staffing in the 40 homes surveyed is based on the above criteria, but this approach does not evaluate actual performance and does not recognize the depth of experience of those without formal training. Accordingly, the study must be regarded simply as an assessment of staff potential. Although this analysis of personnel in the homes visited concerns itself only with the paid staff, many homes, through excellent public relations and public interest, had the services of a substantial number of volunteer workers. These volunteers were invaluable from the standpoint of actual services performed and the psychological effect on patients and community.

Table 3 shows a distribution of paid personnel in all categories on an equivalent full-time basis by individual homes listed in order of ascending bed capacity. No evaluation from an operational standpoint was made of these staffing patterns, but the information may be of interest. Only the nursing personnel has been identified by level of formal training, but over half of the homes had full- or part-time staff members professionally trained in their specialty, including physicians, physical and occupational therapists, chaplains, and social workers. These part-time staff members are listed in the last column under the category, Other. For the total patient population of 2,199, there was an equivalent full-time staff of 1,340 persons, or approximately 1.6 patients per staff member. On the basis of bed count, the figure is 1.8 beds per staff member. Stated another way there was an average of 61 employees per 100 patients and 55 employees per 100 beds at the time of the visits.

Frequently staff members had more than one assigned duty, particularly in the smaller homes. Some of the homes without institutional laundries had personnel assigned to laundry service for patients' personal clothing. Domestic equipment in the homes was used for this service. Linens and institutional items were done commercially.

When the total staffing is converted to a rate of equivalent full-time staff per 100 beds, a substantial variation in staffing level appears. The median rate per 100 beds is 52 but the range for individual homes is 33 to 98 (table 1, p. 2).

By actual count, the nursing staffs in the 40 homes surveyed included 964 persons. Of this number, 759, or 79 percent, were employed full

time and the remainder on a part-time basis. The highest percentage of part-time personnel by level of training was among registered nurses (40 percent). By contrast only 3 out of a total of 103, or 2.9 percent, of licensed practical nurses were employed less than full time. Nurses in both categories represented 24 percent of the total nursing staffs. This provided an average ratio of one trained staff member to each 9.3 patients, or approximately 11 staff members per 100 patients. Of the entire nursing staff there was one member for each 2.3 patients, or 44 nursing staff per 100 patients.

Hospital-operated homes show a somewhat different staffing pattern from those which were not operated by hospitals. This may be attributed to certain factors such as the availability of hospital resources to provide more flexibility in meeting staffing needs. The interchange of personnel caused some minor fluctuations from day to day, but figures obtained on the visiting date show the trained nursing personnel in these homes to be 32 percent of total nursing staff as compared with 22 percent in those homes not hospital-operated. On the basis of adjusted full-time equivalent, this provided an average of 1 trained staff member for 5.8 patients or 17 staff members per 100 patients in the hospital-operated homes. In homes not operated by hospitals, one trained person was provided for each 12.3 patients, or about 8 such personnel per 100 patients. The median for trained personnel is shown in table 4 for each of the above categories of homes. On this basis the ratio still shows a somewhat greater number of trained staff per 100 beds in the total hospital-operated homes. Table 4 also indicates medians in total staffing as well as bed capacity.

Table 3. DISTRIBUTION OF PERSONNEL IN 40 NURSING HOMES ^{a/}

Homes Number	Number of Beds		Nursing Staff			Adm.	Die- tary	House- keeping	Laundry	Plant Oper.	Other ^{b/}
	Total Personnel		RN	LPN	Other						
Total 40 homes	2,434	1,340.0	107.0	98.5	656.5	82.0	182.5	95.5	47.0	48.0	23.0
27	26	8.5	-	1.0	5.0	1.0	1.0	.5	c/	c/	-
6	27	13.0	1.0	-	5.0	1.0	3.0	1.0	1.0	.5	.5
2 d/	28	27.5	8.0	4.0	6.5	2.0	4.0	2.5	e/	.5	-
19 d/	29	20.5	2.0	.5	13.5	.5	2.5	1.5	e/	e/	-
40	29	16.5	2.0	2.0	7.5	.5	1.5	.5	2.0	.5	-
16	30	20.5	1.0	3.0	8.5	2.0	3.0	1.0	.5	1.0	.5
12 d/	32	17.5	1.0	-	12.0	1.5	.5	2.0	e/	.5	-
34	35	22.5	3.0	1.0	11.5	1.5	2.0	1.5	c/	1.0	1.0
11	38	19.5	.5	2.0	10.0	1.0	5.0	.5	.5	c/	-
29	38	18.5	1.0	-	12.0	1.0	1.5	1.0	1.0	1.0	-
8 d/	39	16.0	.5	10.0	1.0	1.5	e/	3.0	e/	e/	-
10	40	17.0	.5	-	9.0	1.0	2.5	.5	2.0	1.5	-
17 d/	40	21.5	2.5	-	14.5	.5	e/	2.0	e/	1.5	.5
9	45	25.5	4.0	-	10.0	2.0	5.0	2.0	1.0	.5	1.0
1 d/	48	34.0	7.0	2.0	17.5	2.5	e/	2.0	e/	1.0	2.0
33	49	24.0	2.0	-	12.5	2.0	4.0	2.5	c/	.5	.5
4	50	25.0	3.5	1.0	7.5	2.0	5.5	3.0	1.0	1.0	.5
13 d/	50	45.5	4.0	5.0	20.0	1.5	6.0	5.0	e/	3.5	.5
20	50	42.5	4.0	12.0	7.0	1.5	5.0	5.0	5.0	2.0	1.0
21	50	23.0	1.0	9.0	6.0	1.0	4.0	1.0	c/	1.0	-
25	51	23.0	-	-	16.0	1.0	3.0	1.0	1.0	1.0	-
22	53	31.5	2.5	3.0	15.5	2.5	5.0	1.0	c/	1.0	1.0
35	53	20.5	3.0	-	10.5	1.5	3.5	1.0	1.5	e/	-
15 d/	56	38.5	1.0	3.0	23.0	1.5	5.5	1.5	1.0	2.0	-
7	58	30.5	2.0	.5	15.0	2.0	6.0	1.5	2.0	1.0	.5
37	58	42.0	9.0	4.0	16.0	2.0	6.5	1.0	1.0	2.0	.5
36	67	27.0	4.0	.5	13.5	1.5	3.5	1.0	1.5	1.0	.5
28	69	41.5	-	6.0	25.0	2.5	5.0	2.0	1.0	c/	-
30	72	29.0	1.0	2.0	17.5	1.0	4.0	1.5	1.0	1.0	-
32	72	37.5	1.0	5.0	18.0	2.0	6.0	2.5	.5	1.0	1.5
5	74	30.0	5.0	-	10.5	2.5	7.0	1.0	2.0	1.0	1.0
14	76	38.0	1.0	5.5	20.0	3.5	4.0	1.0	1.0	1.5	.5
24	82	43.0	2.0	3.0	26.0	2.0	4.5	1.0	1.0	3.0	.5
23	83	36.0	2.0	1.0	19.0	3.0	5.5	2.0	2.5	1.0	-
3	106	45.5	3.0	1.0	19.0	3.0	10.5	4.0	3.0	1.0	1.0
39	107	53.5	6.0	-	27.5	5.0	8.5	4.5	c/	1.0	1.0
26	122	84.0	5.0	11.0	37.5	3.0	11.5	9.0	3.5	3.0	.5
31	130	45.5	2.0	-	23.0	4.0	5.0	6.0	1.0	3.0	1.5
38	131	78.0	4.5	-	50.0	7.5	6.0	9.0	c/	1.0	-
18	141	107.0	4.5	.5	58.0	3.5	16.0	6.0	8.5	5.0	5.0

^{a/} The number of full-time and part-time personnel was adjusted to an equivalent number of full-time personnel.

^{b/} Includes professional staff such as physicians, occupational therapists, physical therapists, chaplains, social workers.

^{c/} Services performed on contract basis.

^{d/} Hospital-operated nursing homes.

^{e/} Services performed by hospital.

Table 4. MEDIAN LEVEL OF STAFFING ^{a/}

Type of Ownership	Number of Homes	Number of Beds (Median)	Staffing Rate Per 100 Beds (Median)				
			Total All Staff	Nursing Staff			Total (Nursing)
				RN	LPN	Other	
Total	40	51	52	4.1	2.5	30	39
Total operated by hospitals	8	40	70	6.9	5.2	39	54
Public	4	45	62	2.5	3.7	39	44
Nonprofit	4	35	71	11.3	7.1	36.4	55.6
Total not operated by hospitals	32	56	50	3.8	1.6	27	36
Public	3	76	76	3.7	7.4	27	48
Nonprofit	10	48	51	4.2	1.0	25	30
Proprietary	19	58	50	2.9	2.9	29	37

^{a/} Equivalent full-time.

PATIENT CHARACTERISTICS

Patient characteristics reflect the nature and extent of the care needed by patients in a nursing home. There was much variability among the patients themselves as well as among the homes providing the care. Accordingly, it appears useful to obtain a broad view of the general or nonclinical aspects of the patients in the 40 homes surveyed. This pattern can assist in identifying the kinds of care appropriate and in defining more specifically the physical facilities that would contribute most effectively in providing such care.

Age and Sex

The median age of the patients in the 40 homes was 79 years with a median range of 54 to 85 years. The actual range obtained from patient records extended from teenage to over 100 years. Homes with patients in the younger age group were generally operated by a hospital as a long-term convalescent type unit.

There were more than twice as many women as men among the total number of patients. For the entire group of 40 homes, the median percentage of women was 70 while the median for men

was 38. Considerable variation was found among the individual homes in the proportion of patients by sex. The proportion of male patients ranged from 6 to 58 percent as compared with 42 to 94 percent for females (table 5).

Degree of Mobility

There was wide variation between homes in each degree of patient mobility. The survey of the ambulatory status of the nearly 2200 patients residing in the 40 nursing homes showed 81 percent or about four-fifths (table 5) who were not completely bedfast. Patients in this group, including those in wheelchairs, were able to move about to some degree. The majority participated in activities, when provided outside their bedroom in other parts of the building and grounds.

Nineteen percent of the patients in the median home were bedfast (table 5); 11 homes had less than 10 percent bedfast; and only 7 had more than 30 percent. The median home had 34 percent fully ambulatory, but 7 had over 45 percent in this category, and in only 7 homes was the figure less than 25 percent. It is interesting to note that in

some of the 18 homes which appeared more actively engaged in promoting physical independence and interest in activities among patients, 10 were found to have less than 10 percent bedfast. In all but one of the remaining 8 homes, the proportion of bedfast patients ranged from 10 to 30 percent.

Hospital-operated homes had an average of 8 percent more wheelchair patients than were found in other types of homes. The hospital-operated homes also had approximately 5 percent fewer bedfast patients.

This variation could reflect the prevalence of postoperative cases for extended convalescence and certain types of therapy.

Mentally Confused or Incontinent

Extreme variation was found among the homes in the percent of patients mentally confused or incontinent. The median home had 41 percent mentally confused patients and 31 percent of the patients were incontinent. Those patients whose condition was not limited physically or mentally accounted

for 343 of the approximately 2,200 patients. The percentage in the median home is 15 percent (table 5).

When compared to the median for all homes, the eight hospital-operated homes have a somewhat smaller proportion of mentally confused (30 percent) and fewer patients not limited physically or mentally (11 percent).

The principal nonclinical characteristics of the 2,199 patients in homes included in the survey are summarized in table 5. In developing these data no assessment was made of admitting policies, composition and attitude of staff, and other factors which may be reflected in the findings.

Bedfast Patients vs. Available Unit Space

In the 40 homes surveyed the trend shows a much higher percent of bedfast patients in those with a low unit space per bed. This trend is most pronounced in the extremely low range of areas, but the level decreases as the unit area increases until an area of about 300 square feet per bed is

Table 5. NONCLINICAL CHARACTERISTICS OF PATIENTS IN 40 NURSING HOMES

Characteristics	Number of Patients	Range of Data (percent)	Percentage in Median Home
Sex			
Male	706	6 - 58	38
Female	1,493	42 - 94	70
Degree of mobility			
Ambulatory	743	11 - 65	34
Semi-ambulatory	494	0 - 42	22
Confined to wheelchair	541	3 - 44	25
Completely bedfast	421	3 - 46	19
Mentally confused	992	7 - 93	41
Incontinent	664	0 - 72	31
Not limited physically or mentally	343	0 - 58	15

NOTE: Total number of patients, 2,199; range of median age per home, 54-85 years; median age in all homes, 79 years.

reached. Above this area there is a slight increase after which little change occurs in the general level, although some fluctuation is shown in the trend on chart 1, p. 12.

The shaded band illustrates a variation of 10 percent above and below the trend and includes two-thirds of the homes studied. It may be significant that in homes where the design restricted total areas per bed the proportion of bedfast patients was more than twice that in some of the homes with areas above 300 square feet. Chart 2, p. 12, shows a similar relationship between percent of bedfast patients and area provided for dining, recreation, and occupational therapy. As previously mentioned, however, no positive

case of cause and effect could be established since no assessment was made of such factors as admitting policies and attitude of staff.

Bedfast Patients vs. Therapy Services

Physical or occupational therapy services in some degree were found in 18 of the 40 homes surveyed. Both programs were under way in 6 homes, while the remaining 12 were engaged in either physical therapy or occupational therapy as a full-time activity. The median percent of bedfast patients in homes which provided these services through specially designed facilities was lower than that of the entire group of 40 homes.

ARCHITECTURAL CHARACTERISTICS

Introduction

Architectural design, in its broadest connotation, should provide the means for a structure to serve its given purpose effectively. This is particularly important in medical care facilities where the function is of a highly specialized nature. Advanced techniques and procedures in medical and nursing care look toward an appropriate and convenient setting so that the staff may provide better treatment and therapy for patients.

Design Concept in Nursing Homes

A more enlightened concept recognizes the important role of the nursing home in the total health care program. This changing philosophy has established the nursing home as a medically oriented facility as well as one offering skilled nursing care. Acute general hospitals are becoming more aware of the advantage of nursing homes and long-term care facilities, either directly operated by the hospital or through affiliation with independent nursing homes. These facilities provide for more continuity of care and extended services. In providing for long-term patients, primarily the older age group with its attendant problems of adjustment, the nursing home is broadening its concern over patient betterment beyond the definitive type of care received in an acute care hospital. Its mission, therefore, is being recognized as restoration of the patient to his optimum usefulness, not only physically, but psychologically and socially as well. A residential environment provides a more favorable

setting to accomplish these objectives. In response to the more sophisticated role of the nursing home, a new architectural expression has emerged which is in sharp contrast to the former picture.

Sponsors of today's nursing homes recognize more fully the importance of the physical plant; it should not only be functionally planned for the many disciplines involved, but it should also create an atmosphere conducive to high patient morale and a positive response to restorative therapy. To what extent are the trends toward improvement resulting in a physical setting that will most adequately and effectively contribute to this accomplishment? Observations made during this survey were quite reassuring in this respect. There is an increasing tendency for nursing home owners to design their facilities around the needs of their patients rather than around such economic factors as higher profits and less care.

In a few instances, however, this enlightened tendency was not architecturally expressed. Apparently the real significance to patients, staff, and public of such elements as character of design, quality of construction, functional arrangement, and utilization of space was not fully considered, or individual conditions limited such consideration.

Basic Factors Which Affect Planning

Basic factors frequently exist which may dictate certain features in the architectural de-

sign. Significant examples are: the attitude and policy of the owner regarding the operational program and maintenance practices; the type and economic status of patients; the scope and nature of services provided; jurisdictional regulations; and affiliation (if any) with a hospital. These were frequently reflected to some degree in the physical facilities. The available budget for construction also was evident as a very real, if often unhappy, limitation on design and physical characteristics. Some owners pointed out that if they wished to exceed minimum requirements which they thought less than desirable, any increase in construction cost would have to be reconciled with the level of anticipated income. This was particularly applicable where there was a high percentage of patients receiving public assistance, since such payments are unrealistically low in many areas. In some cases there was an apparent relationship to the quality of facilities and service in those homes primarily dependent on this source of income.

Exterior Design and Site

The external face a nursing home presents to the public is not only responsible for the image created but also often reflects the interior environment and the attitude toward patients. Most of the homes visited were of contemporary design, more informal and domestic than institutional in character, and in harmony with the architecture of the surrounding community. They were further enhanced by an attractively landscaped setting with outdoor areas for exercise and recreation, and their appearance presented an inviting atmosphere for the public as well as patients. With few exceptions the homes were located in small communities, away from heavily congested areas but convenient to transportation and other community facilities. This is important to avoid a feeling by patients of complete isolation from society. Such a location, if easily accessible, also encourages visits by physicians and the public. Not all homes, however, were entirely successful in their location, siting, and design.

Construction Features

The majority of the homes visited were free standing of one-story construction, although six were physically connected to a hospital with a sheltered passage. Less than half the buildings had full or partial basements, and only two were multistory above grade. Several, however, were

designed for vertical expansion. Construction was basically of a conventional type with concrete floor slab on grade or fill, masonry bearing walls and interior partitions, and steel roof framing with a poured or prefabricated deck and built-up roof. Homes with brick veneer facing predominated; the others were exposed concrete block except two which had wood siding. Seven had wood framing in exterior walls and roof, and two built without Hill-Burton funds had wood floor systems. Fifteen homes had pitched roofs with shingles or built-up roofing. Interior partitions in a number of the homes were also framed in wood. Wood sash were used in a few instances, but aluminum or steel, often of light weight, were more prevalent. In discussing windows, it was suggested that care be exercised in selecting the type as well as the operating hardware to avoid hazards and permit ease of operation by the patients. All the various types of construction presumably met applicable fire resistance codes, although some made rather extensive use of combustible materials. Adequate measures for fire safety were not always apparent. This should be of primary concern, especially since an appreciable number of patients were found to be mentally confused or physically handicapped, which would increase the problem of evacuation in case of an emergency.

Interior Environment and Finishes

The character of the nursing home interior is perhaps of more immediate benefit to the environment of the long-term patient than is the impression created by the exterior appearance of the building. Many of the homes made use of large glass areas, particularly in the recreation and activity rooms, which contribute immeasurably to a more cheerful and informal atmosphere and relieve the feeling of confinement. Interior decoration and furnishings were appropriately chosen for function and appearance to further enhance the setting and brighten the surroundings. The climate created by such interiors was accentuated on occasion by contrast with other homes which were crowded, dismal, and depressing. In such cases the purposeful use of color and interior furnishings as therapeutic aids apparently was not fully realized as this was not in evidence. Furniture and equipment, some of which were owner-built, were not the most appropriate or convenient for patient use. Frequently an unfavorable reaction to such an environment was noticeable in the general attitude of the patients. Some owners, however, seemed

unaware of this or felt that the effect on patient morale and comfort did not warrant an attempt at improvement.

Interior finishes are a major consideration not only in creating a warm and attractive atmosphere but also in maintaining cleanliness and contributing to reduced maintenance. In some homes, usually those built with very low construction costs, these advantages were apparently sacrificed. Concrete floors were left exposed in bathrooms, janitors' closets, soiled linen rooms, and similar areas where at best it is difficult to maintain sanitary conditions. In some instances plaster and plasterboard walls in these areas were not protected by an impervious finish, and trim was omitted at the floor. Other surfaces were also left unpainted, making it difficult to maintain proper cleanliness. Sand finish plaster was found on the walls in one home and as a wainscot around tubs in another. This type of finish is difficult to clean and can be irritating when it comes in contact with the skin.

Acoustical treatment of ceilings in corridors and public areas was found in a high percentage of homes and in all but a few instances was believed desirable. One home had two rooms designed for noise control, and several others thought this would be an advantage. Unfortunately, some of the acoustical material was of a combustible nature. Hollow core wood doors in corridors and exit passages, not permitted under nationally accepted codes, were used in an appreciable number of homes and were apparently allowed under certain jurisdictional requirements. Some of the hardware appeared to be of a competitive residential grade rather than the heavier commercial or specialized type. In this connection, lever-type handles are much easier for nursing home patients to operate than doorknobs.

Use of Space

The size and arrangement of space is a basic consideration in architectural planning. In view of the patient characteristics and the extended nature of residency in a nursing home, areas should be generous to avoid a feeling of institutional confinement and to encourage mobility. Generous space for ease of movement and diverse activities can provide an effective incentive to physical improvement as well as social and mental adjustment and may well be a valuable investment in the rehabilitation effort. Some homes increased the areas for ancillary and service facilities with the

intent of making future bed expansion more economical.

Unit areas per bed in the homes visited showed a broad range in total square feet per bed from a minimum of 147 to a maximum of 740. The maximum area in homes without Hill-Burton aid was approximately 300 square feet per bed, while this same area represented the minimum in Hill-Burton-aided homes. Whether or not this feature is indicative of the type of care and treatment received by patients, it is quite significant as an index of the livability of the home and the scope of services provided. Several homes, physically connected with a hospital, reduced their total area by using the kitchen and other facilities and services in the hospital. More area per bed implies more comfort and convenience for patients in such features as a higher percentage of private or semiprivate rooms (table 6), a greater number of plumbing fixture units provided (chart 8, p. 22), and increased space for various functions and activities. It also suggests a broader program of services and more convenience for the staff in meeting patient needs. Such features could be expected to contribute to better therapy, to a higher morale, and to a greater incentive for patients to become more active.

Number of bedfast patients showed a tendency to be higher in those homes with a very low total unit area per bed (chart 1) and a similar relationship was indicated where there was a limited unit area for dining, recreation, and occupational therapy (chart 2). However, as pointed out previously, a direct relationship in this respect could not be definitely established, since the admitting policy of the home, attitude of the staff, and other considerations may have been involved.

Space is extremely important in implementing an effective program of restoration. This is particularly true in recreation, dining, and occupational therapy areas. Valid reasons were found for ample space in the areas on the basis of patient characteristics. On an average, more than 80 percent of the patients in the 40 homes were ambulatory or mobile to some degree (table 5, p. 7). Wheelchair patients, those using aids to mobility, and many less active older persons require more than the normal space for their activities; they, therefore, should not feel limited in their mobility or activities. With an allowance of 20 to 25 square feet for this type of patient seated in the dining room and a like amount of space for recreation and occupational therapy areas, the figure of 50 square feet for 75 percent of the beds does not appear unrealistic for these

functions. Homes having this amount of space found it quite advantageous. As an example of the use of such spaces, some homes rolled beds into the lounge for entertainment programs; another brought a bed patient on a stretcher to the dining area for feeding. The allowance for dining, recreation, and occupational therapy space to the extent of 50 square feet for 75 percent of the beds, required by certain regulations governing Hill-Burton aid for nursing homes, is the equivalent of 37.5 square feet per bed for the total bed capacity. Nearly all the homes built with Hill-Burton aid exceeded this figure as shown in chart 3, p. 13. However, several fell slightly below this level because of subsequent additions or an increase in bed capacity. The median level of space provided in such homes is 48 square feet per bed. Only a few homes built without Hill-Burton aid approached the Hill-Burton standard. The median found in such homes was 19 square feet per bed.

Space economy in homes having a low average

area per bed usually restricted certain major functions such as central dining, recreation, occupational and physical therapy (chart 3), and treatment and utility services. Many of these were completely omitted. Other areas that were limited included patient rooms (chart 4), kitchen and dishwashing areas, nurses' stations (some consisting of a table in the corridor), utility rooms, administrative offices, corridors (some 5 feet wide), storage, housekeeping and employees' facilities. Inadequate space made it difficult for the staff to operate efficiently and to practice basic principles of sanitation and cleanliness. In four of the homes, corridors and doors were so narrow that beds had to be taken apart before they could be moved from rooms. Narrow corridors in a nursing home can be especially hazardous for patients who use them extensively. Although more than 80 percent of the patients were found to be mobile, many were handicapped in their mobility. Narrow corridors also increase the risk in emergency evacuation of physically disabled and mentally confused patients.

Table 6. DISTRIBUTION OF HOMES AND BEDS BY CAPACITY OF PATIENT ROOMS

Item	Total	Total Square Feet Per Bed (Median)	Bed Capacity of Patient Rooms				
			1 -Bed	2-Bed	3-Bed	4-Bed	5-Bed
Number of homes							
All homes	40	301	35	38	9	18	1
Homes without Hill-Burton aid	20	236	15	20	9	10	1
Homes with Hill- Burton aid	20	400	20	18	0	8	0
Number of beds							
Total in all homes	2,329	301	442	1,318	138	396	35
In homes without Hill-Burton aid	1,362	236	135	858	138	196	35
In homes with Hill- Burton aid	967	400	307	460	0	200	0
Percent of beds							
In all homes	100	301	19.0	56.0	5.9	17.0	1.5
In homes without Hill-Burton aid	100	236	9.9	63.0	10.1	14.4	2.6
In homes with Hill-Burton aid	100	400	31.7	47.6	0	20.7	0

CHART 1. Bedfast Patients vs. Total Unit Area

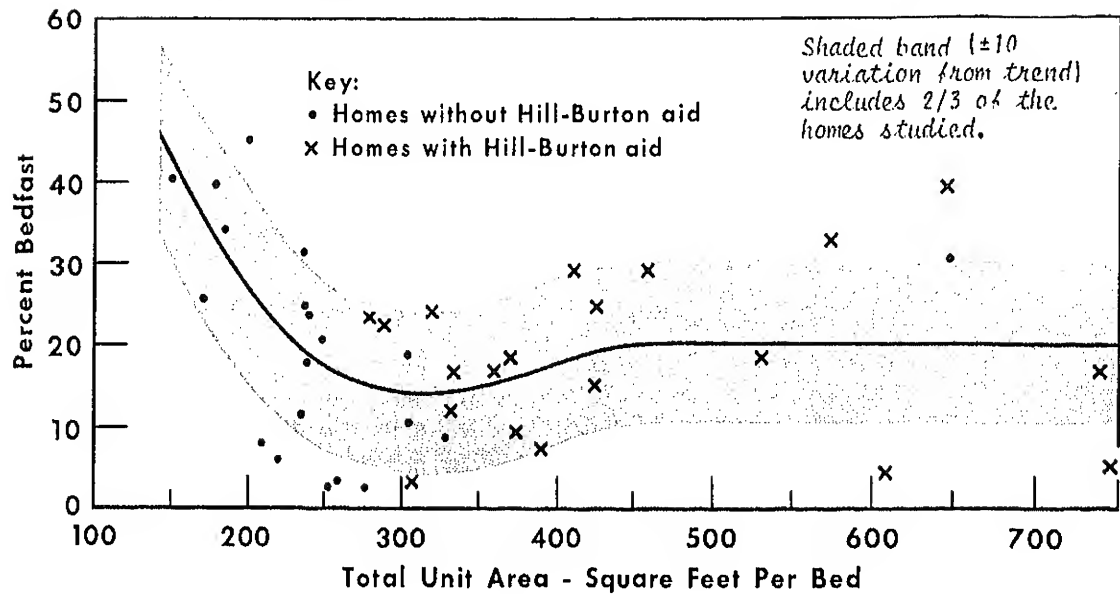


CHART 2. Bedfast Patients vs. Dining, Recreation, and Occupational Therapy Area Per Bed

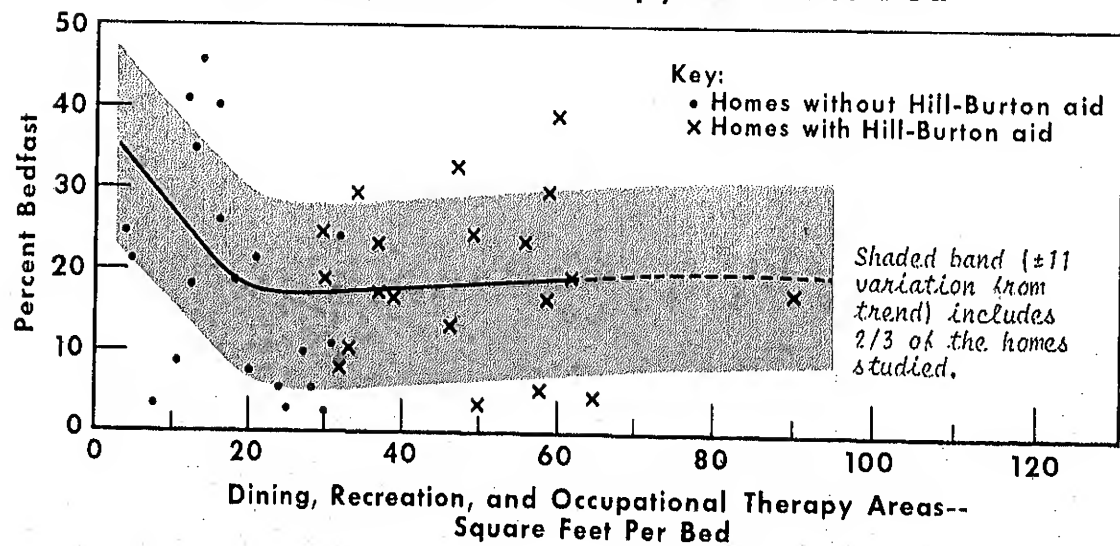


CHART 3. Dining, Recreation, and Occupational Therapy Area Per Bed vs. Total Unit Area Per Bed

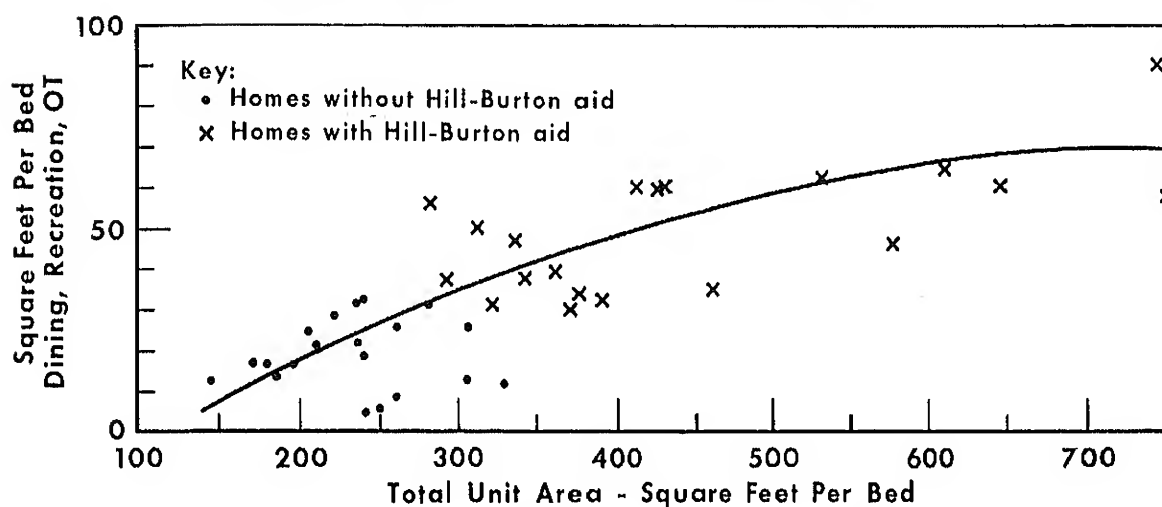
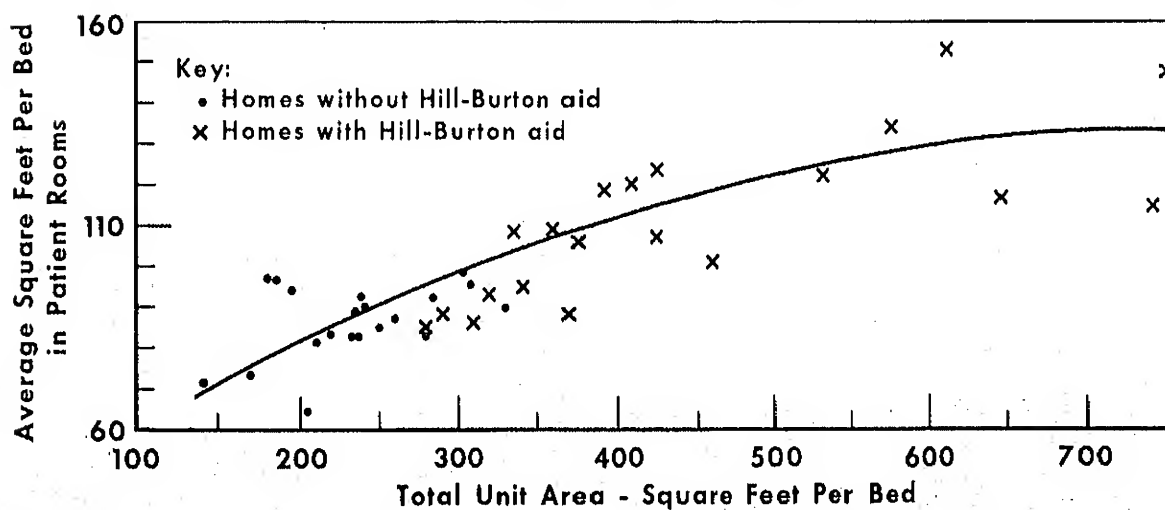


CHART 4. Average Area Per Bed in Patient Rooms vs. Total Unit Area Per Bed



Fire and safety hazards were noted which frequently occur when areas are overcrowded and forced into inappropriate use. Many administrators and staff members commented that effectiveness and efficiency could be increased with more space for various functions.

Exterior space for outdoor activities of patients is also important in creating an attractive environment and an escape from a feeling of confinement. This was lacking or extremely limited and hazardous in some homes. Frequently facilities for parking and service deliveries were also less than adequate.

Arrangement of Space

It appeared that space in some homes, although seemingly adequate, could have been more fully utilized or efficiently arranged if there had been a clearer understanding of function. Alterations were made in some instances, but this is often impractical and at best is a poor substitute for better planning initially. The following list of some of the less desirable features noted in the survey or pointed out by administrators were not all found in any one home, but are representative of items that may be of interest to planners:

1. Occupational therapy or other patient areas located on a basement level but accessible only by stairs. This precluded or limited the use of such areas.
2. Laundry, storage and other service functions in the basement with no elevator, dumbwaiter, or inside access.
3. Lack of proper separation of functional areas, such as kitchen and recreation, from patient rooms.
4. Utility rooms located inconveniently and with indirect access.
5. Combination soiled and clean utility rooms. These invite contamination.
6. Nurses' station inconvenient for service and control.
7. Inadequate space for medications and nurses' work area.
8. Inadequate or no space for recreation and no individual dayrooms.

9. Lack of appropriate space at main entrance for patients to observe activities without crowding the entry.

10. Inadequate space and poor arrangement in patient rooms.

11. Lack of office or room for medication, counseling, and conference.

12. Inadequate wheelchair and stretcher parking space.

13. Insufficient kitchen and dishwashing area.

14. Showers, tub rooms, and toilets inconvenient in size and arrangement for use of disabled patients and their attendants.

15. Lack of storage space.

16. Ratio of single rooms to total beds too low. (See table 6, p. 11.)

17. Inadequate space and proper facilities for employees (lockers and toilets).

Effect of Operational Changes on Planning

Conditions that a visitor may find after construction is completed may indicate planning deficiencies or inefficient use of space, but these should not be arbitrarily attributed to the architectural design. Frequently the architect has complied with initial instructions, but operational policies and service programs are later changed. These changes may involve alterations in the plan or simply changing a space designation. Failure to follow through on the program initially proposed or conversion of functional areas to inappropriate use can lead to an ineffective and inefficient arrangement. Future changes cannot always be anticipated, but more careful thought on initial programming might pay dividends later. The following examples are cited as illustrations of conditions found in various homes.

Physical and occupational therapy facilities were not being fully utilized in a number of homes although well-planned initially. This resulted from a lack of emphasis on such services after construction was completed. However, the mere existence of suitable facilities, though not presently in use, may encourage a full implementation of these important services in the future.

After two years, the administrator of one home recognized the value of this aspect of restorative care and has now activated physical therapy as originally programmed. Six homes had adequately planned facilities, both in space and equipment, for physical therapy and were conducting very successful programs. Parenthetically, one gratifying case concerned an 80-year-old patient who had been fitted with a prosthetic lower limb and was quite happy with his new found mobility. Eight other homes were actively engaged in these services but were limited in their efforts both by space and equipment. Several homes with small bed capacities had an appreciable number of outpatients which more than justified the rather complete facilities they had included. Well directed occupational therapy programs with special facilities and equipment were in operation in only six homes. Four others had such areas, but they were converted to other use. Two administrators indicated an intention to initiate this service, although no adequate facilities were available. It would appear from the results observed that proper planning initially for physical and occupational therapy would be justified.

Conversion of existing areas is seldom a satisfactory answer in meeting space needs. Such measures are not only costly but usually result in restricting other needed services and compromising with functional arrangement.

When the value of physical therapy was recognized in one home, it was necessary to convert an employees' locker room to this use with obvious disadvantages to both functions. Similar inconvenience was also experienced by another home in converting a storage area to physical therapy use.

Still another home converted a general store-room to use for patient beds with consequent ill effects. This room was located in the service area, isolated from the nurses' station and without a nurses' call, lavatory, or toilet facilities. Doors were narrow and no lockers or clothes storage spaces were available. Inadequate heat, ventilation, and light, as well as other detriments to good patient care were evident.

In a number of homes lavatories were replaced with shampoo sinks for beauty treatments. Some were in small toilet rooms with the result that facilities were quite inadequate for the new function, and use of the needed toilet room was thereby limited.

After the start of operation, two homes adopted a policy of complete separation of the sexes. This necessitated numerous conversions and resulted in inefficient and inappropriate use of space with additional difficulties for the staff.

Some conversions, however, may be more successful. For example, one home had converted a patient room, otherwise in a poor location directly across from the kitchen, to a private dining room for feeding patients who had difficulty in eating. This was certainly a desirable improvement.

Treatment and consultation rooms were not used as fully as might have been expected; some had been converted to patient rooms and other uses. Although it would not appear conducive to the best techniques and would offer less privacy for patients, many physicians and nursing staffs seemed to prefer administering treatments in patient rooms. It seems inconsistent with accepted concepts that a modern medical care facility should not have a properly arranged and equipped area for medical procedures to assure the best level of patient care. In addition to its use for examination and treatment, this area could also serve as a nurses' work and supply room. This would remove some of the congestion at the nurses' station and permit more ease in charting or admitting. The treatment room could perhaps also be used as an area for limited physical therapy. Consultation rooms were among the first areas to be converted to patient space when additional beds were needed. In a number of homes where no consultation or conference rooms had been provided, administrators felt the need for such facilities. Social service workers, clergymen, families of patients, and others frequently wish to visit the patients in private. These rooms can also be used by the staff for conferences and interviews. One home had arranged such a room as a place for spiritual meditation and felt it was extremely important. Another home had converted a small closet into a prayer room. Religious values have a deep meaning for many of the patients, and some provisions for meeting this need may well be considered.

Bed placement did not always remain the same as originally planned for the patient room. Changes occurred because beds were added for which the room was not designed, because patients wanted more open space in the room, or they felt more secure with the bed against the

wall. There was no strong objection by the nursing staff to the latter arrangement, particularly for those patients not requiring intensive nursing care. As a result, however, beds were poorly placed, some directly in front of windows. Over-bed lights, nurses' call, and other stationary equipment were improperly located for the changed arrangement, creating further inconvenience. These findings would suggest that in planning, the relocation of beds and other changes for an alternate arrangement should be anticipated. Lights attached to beds or the use of floor lamps and extra long cords on nurses' call would permit more flexibility.

Room furnishings in one of the patient wings of a particular home were not planned originally for nursing service. Instead, this section was intended for ambulatory patients not expected to require bedside care. The administration has since found that it would have been advisable to provide for this type of care in all rooms. To provide more flexibility and proper nursing care, this administrator must now install a nurses' call and other necessary equipment and furnishings in these rooms. Nursing homes, as such, normally admit only those patients requiring some type of nursing care or attention, and even if fully ambulatory on admission, their condition is subject to unpredictable change.

Adjunct services such as laboratory, dental facilities, and drug room should be discussed in initial programing. One home had included a dental office but omitted a laboratory. This was added later through conversion of existing space. Another home had converted existing space to a dental office. It would have been much more satisfactory had it been planned initially. Some of these services may be justified, particularly in larger homes.

Patients' laundries, where items of personal clothing could be laundered by patients, found little use. Although these would appear to have some value as a therapeutic aid, where they did exist, practically all the owners and administrators felt this aspect did not justify hazards involved and the unsatisfactory manner in which laundry was done by patients. Where patients were interested in doing their own laundry or were permitted to do this, the staffs felt that laundry trays were safer and more practical than automatic equipment. Many of these laundries were converted to linen rooms or other uses or were retained as laundries with the staff doing the personal laundry of patients. For this purpose, small commercial equipment

was recommended as more practical and economical than the domestic type. When laundries were used in this manner, it was suggested that they be located in the service wing rather than in the patient area. Thirteen homes had laundries adequate in space and equipment to handle both institutional and patient laundry; one other was operating under severe space limitations and was seeking some way to expand; six had laundries that handled the entire laundry load but left much to be desired in space and equipment.

There was the general feeling among those interviewed that operators of nursing homes of 35 to 40 beds and over should consider including a fully equipped institutional laundry in their physical plant. This would depend, however, on local conditions and such factors as commercial rates, linen supply services, and replacement costs.

Barber and beauty facilities that were adequate were found in only five homes which had thoughtfully included a barber and beauty shop in their plans. Others had made conversions of various kinds to provide these services or used a central bathroom, small toilet room, utility room, or other unsatisfactory expedients. There was full agreement that provision for these services was a most important morale feature.

Isolation rooms or nursing units with specially designed features for emotionally disturbed patients were found in only five homes. Although many of the homes had definite policies regarding admission of such patients, this survey showed the percentage of mentally confused in the median home to be substantial. When these cases became more severe or emotionally disturbed, few of the homes had facilities to care for them, even on a temporary basis, without creating a serious problem of supervision by the staff. Some consideration should be given in planning to provide at least minimum facilities for their special care and safety.

Fixtures and Equipment

Fixtures and equipment are important elements in a nursing home and can have a direct bearing on the level of patient care in the convenience they provide for both patients and staff. Such items must be adequate as well as appropriate for the purpose intended to assure proper usage, good techniques, and efficiency, in addition to safety. It was noted on occasions that some electrical, plumbing, and other fixtures, and

equipment were of economy grade and not entirely suitable for their purpose. Good quality in such items can increase their durability as well as effective use, but funds may not be available to secure this advantage.

Patient lifts varied all the way from an overhead chain hoist to the hand-carry method. The chain hoist for lifting patients into a bath tub was said to be difficult and inconvenient to operate as well as hazardous and frightening to patients and had been used only once or twice. Portable lifts found some disfavor, also due to patient reaction, while fixed lifts gave no complaints. An appreciable number of nursing personnel preferred lifting patients in and out of tubs.

Plumbing fixtures ranged from the most specialized hospital type to the least expensive that would serve the purpose. They also varied in number from the situation in three homes where the staff felt that some of the fixtures, such as full private baths for every room, were not justified by use to conditions in other homes where the number appeared quite inadequate.

Bathing was scheduled and attended for protection of the patient and convenience of the staff, and there were few exceptions to this rule. Because of this, the recessed tub at conventional height was inconvenient for attendants. A majority of the administrators and nursing personnel agreed that at least one tub should be elevated and of the institutional island type. The tubs in one home had been raised after the home was in operation. Tubs were more popular than showers, partly because of patient choice, but generally staff members stated that showers would receive greater use if properly designed. Adequate size, convenient access, omission of raised curbs, and properly located grab bars would make them more acceptable. Three or four homes had showers large enough for stretchers; and staffs in these homes thought this was desirable. Spray attachments with long flexible extensions and remote controls are convenient features on both tubs and showers. In the few instances where bathing is unattended, a conventional tub would be more convenient for patients.

Toilets adjoining patient rooms are recognized as most desirable, and private toilets are preferable if funds permit. With this arrangement, the majority of administrators felt that one toilet should serve not more than two semiprivate rooms or four patients. Training toilets were considered desirable, but it was pointed out by some of those interviewed that wheelchair patients had no difficulty transferring to a water

closet in a 3-foot-wide stall if grab bars were properly located. The length of the stall should provide space for a wheelchair with door closed. In this connection a bar handle rather than a knob would facilitate closing the door by a wheelchair patient. Rather than elevate the water closet as a permanent installation, seat attachments are preferred for the few occasions when this was needed. Most nursing personnel agreed that bedpan washers on individual water closets were extremely desirable for convenience and control of odors by avoiding bedpans being carried through corridors. However, these were not found in at least 30 percent of the homes. Some administrators cautioned that in addition to using these attachments, a thorough cleaning and sanitizing of bedpans at frequent intervals was necessary. This requires a separate soiled utility room to be used for cleaning and storing soiled items, which is most essential under any conditions, but such rooms were not always provided. In one home, a janitors' closet scarcely large enough for a small service sink and with no floor space, work counter, or handwashing facilities was used for this purpose. One nurse admitted that at times bedpans were washed in patient lavatories for lack of proper facilities.

Lavatories in or adjoining patient rooms were omitted in eight of the homes. Aside from inconvenience to the mobile patient, this omission is not conducive to the best technique in nursing care. Generally speaking, lavatories were wall-hung and of sufficient height for wheelchair patients. Some were the corner type, and others had a minimum projection from the wall due to their small size. These were not convenient for wheelchair patients, although there were remarkably few complaints. Only two homes had lavatories extended from the wall as recommended by some authorities, but a number had vanity-type installations with counter lavatories. The latter resulted in a greater extension from the wall, and patients indicated that these were quite satisfactory. However, in such installations the fixture should be placed near the front of the counter, and the apron beneath should be omitted to provide more clearance for wheelchairs. Several administrators felt that goose-neck spouts presented a hazard for patients. They suggested a swivel type or a fitting with less height above the basin, which would still permit utensils to be filled. Blade handles were not thought necessary for patient use, but the lever types were desirable. In only a small percentage of the homes was the mirror located conveniently for patients in wheelchairs.

Sterilizing in a nursing home requires less equipment than is necessary in a hospital. Most of the homes had a portable type autoclave which was felt to be adequate to handle the recognized need for sterilizing such things as syringes and other small items, but the autoclaving of bedpans was not considered necessary. Chemicals were used for the purpose of sterilizing. However, three homes, independent of hospitals, had autoclaves of sufficient size for bedpans and other large utensils, and the operators considered this important. Parenthetically, many authorities feel that personal utensils of patients should be autoclaved at least before use by other patients. A large autoclave had been installed in one home after it started operating. Sterilizing facilities in the hospital were used for periodic needs by those homes under hospital administration when such resources were conveniently accessible.

Nurses' call in three homes consisted of a handbell by the patient's bed; five others had a buzzer type system with no callboard or provision for identifying the call at the nurses' station. This resulted in inefficiency and lessened the possibility of prompt patient attention. At least 30 percent of the homes had equipment other than the standard hospital push-button type. Two-way audio calls were found in eight homes and there was no convincing opinion that the audio feature was necessary in a nursing home.

Other items of equipment not entirely appropriate or infrequently used were noted on occasions. Three homes had stainless steel built-in ice bins which were not being used since they were not considered satisfactory. Ice machines were installed in less than 50 percent of the homes; in others ice was obtained from refrigerators in the kitchen when needed. Several homes had old-style galvanized iron water-coolers, and only about 60 percent had drinking fountains. Improperly designed fountains had been taken out of service in one home because water spilled on the floor from the fountains was a hazard to patients. Some kitchen equipment, particularly sinks and stoves, was occasionally of economy grade such as enameled steel or galvanized iron. The condition of such equipment testified to the advantage of a better quality material. Salvage fixtures, not entirely appropriate for their purpose, were occasionally noted.

Handrails were omitted completely in at least six homes, and walking without this support was difficult for some of the patients. One administrator rationalized that handrails discourage self-

reliance, but there was no agreement from the remainder of the homes that this justified their omission. Grab bars were inadequate, poorly located, or insecurely anchored in a noticeable number of homes. These are relatively inexpensive items and are essential safety measures. Handrails should be returned to the wall at the end of each sectional length.

Mechanical and electrical systems in some of the homes were not well designed and fixtures were of competitive quality. Heating was by warm air and often the system did not provide good circulation and control of odors. Adequate circulation of air and air change are extremely important in a nursing home, and gravity ventilation is seldom satisfactory. Windows in such places as the exterior wall of toilets and utility rooms are rarely opened, and poor ventilation results. Hot water seems to be the most desirable type of heat and was more generally used with a mechanical system of ventilation. Opinions differed on cooling and were influenced largely by the climate and the fact that older persons are more sensitive to cold than heat. However, cooling with humidity controls should be seriously considered to provide year-round comfort. There was no strong feeling that the additional cost for individual temperature controls in patient rooms was justified. Factors to be considered were increased maintenance, agreement between patients in rooms with multiple occupancy, and the fact that doors normally remain open.

Lighting can contribute much to the interior atmosphere of a home, but this effect was not always found. In addition, in numerous instances, the lighting intensity was not suitable to the use of the areas and lighting fixtures were not entirely appropriate in design and location for the intended purpose. Many homes had changed the bed arrangement in patient rooms. This possibility should be considered in locating wall-mounted fixtures and nurses' call. It was suggested that convenience outlets should be at least 24 inches above the floor, in sufficient number, and located so as to avoid long extensions. There was no significant objection to floor lamps; many felt that floor lamps and lights fixed to beds permitted more flexibility in furniture arrangement and created less of an institutional appearance. Night lights of some type were considered important, although they were not a part of the electrical system in at least 30 percent of the homes visited. Some facilities for emergency lighting, particularly of corridors and exits, were generally required by regulations and found in most

of the homes; a few jurisdictions required sprinklers or fire detection systems in certain areas.

Comments by Staff Members

The review of architectural characteristics of the nursing homes which is included in the study is illuminated in a number of significant aspects by actual comments received during the study. These comments were unsolicited. They came from administrators and principal staff whose duties gave them both responsibility and opportunity to observe practical aspects of nursing home design. The citations are representative of the broad range of concern from the many comments received:

- Door closers should be installed so that they are not hazardous.
- Patients with poor vision have walked into full length glass doors.
- All or a majority of beds should be hi-lo hospital type.
- Built-in dressers are preferred over the movable type.
- An active physical therapy program may shorten the stay of many patients.
- Private or semiprivate toilets are most desirable.
- All toilets should have nurses' call.
- An alarm on the exterior door, which alerted the nurse, saved the life of one patient who wandered out at night in severe weather.
- Single-bed bay arrangement for double rooms is better than two beds parallel.
- A separate dining room for staff is desirable for such reasons as staggered schedules and a desire for privacy.

- Requests for private rooms are twice those for multiple occupancy. Fifty percent of the beds should be in private rooms.

- Corridors should not be less than 8 feet wide.

- A treatment room is a must.

- Convectors in corridors are subject to damage by wheelchairs and wheeled equipment.

- A security safe for patients' valuables is desirable.

- Small day-rooms should be provided in addition to the main lounge.

- A locked drug room is desirable for proper control of drug supply.

- Clean linen should be readily accessible to patient rooms for emergency changes.

- Round handrails are better than a square or shaped section.

* * * * *

In summary, this section of the study has been concerned primarily with a discussion of some of the major planning considerations in the design of a nursing home and how they were expressed in the homes visited during the course of the survey. This section also includes various comments based on conditions found in the detailed study. It would not be possible to outline all the desirable features noted and all that should be considered in planning a facility of this nature. Most of the homes visited were of recent construction, and there was no doubt that the majority possessed such features in large measure. With few exceptions they were sound examples of architectural planning. Architecture has here made a major contribution to better design, and with increasing interest and concern, continued progress may be expected.

CONSTRUCTION COSTS

Cost data were compiled from information and reports obtained at the homes as well as from Hill-Burton records. Wide variations in construction methods and contractual procedures on homes built without Hill-Burton aid and the frequent inability to obtain precise data led to con-

siderable difficulty in ascertaining expenditures that would provide an objective basis for comparison. Accurate drawings were not always available on such projects, and field measurements and sketches were sometimes necessary to relate reported costs to physical features. In

some instances basic assumptions had to be made from observations, and conclusive verification was not always possible. However, unit costs have been developed from the data available to reflect both the cost per square foot and per bed for each of the homes surveyed. A comparison was made of basic cost patterns with respect to total unit space provided per bed, but obviously no two homes are identical in all aspects that would affect cost.

In obtaining data and making these cost analyses only construction and built-in equipment normally included in a general contract have been considered. Consequently the cost of site, movable equipment and furnishings, architects' fees, and other incidentals are excluded. Some of these were not involved in all cases. In other situations they would have been difficult to define and catalog.

Cost Per Bed

The total area per bed has direct bearing on the size of the building and obviously, all other factors being equal, the construction costs per bed increase with an increase in area per bed. (See chart 5.) In the 20 homes surveyed that were built without Hill-Burton aid, the total space, on a unit basis, ranges from a minimum of 147 square feet per bed to a maximum of about 300 square feet per bed with a median area of 236 square feet per bed.

The trend value of unit cost per bed rises steadily over this range from \$1,500 per bed to about \$4,500 per bed. (See chart 5.) At the median area of 236 square feet, the cost corresponding to the general trend pattern for this unit area (trend cost) as shown on chart 5 is approximately \$3,125. Among the 20 Hill-Burton projects surveyed, homes with the most limited design were just about comparable in unit space to the most ample homes without such aid--about 300 square feet per bed. Areas in homes receiving Hill-Burton assistance ranged from 300 to 740 square feet per bed. The trend of unit cost per bed in this range of unit area extended from \$4,500 per bed to about \$14,000 per bed. For the median area of 400 square feet per bed in homes with Hill-Burton aid the trend value of unit cost was \$6,500.

A summary of the unit areas and unit costs per bed is shown in table 7. As indicated, the median area provided in homes without Hill-Burton aid is somewhat lower than for Hill-Burton aided homes. On the basis of figures shown, if an ad-

justment were made to equate the areas and to consider similar contractual procedures, it would present a somewhat different picture. This would provide a more valid comparison and reduce the actual disparity in costs per bed for the two categories.

The actual area within the patient rooms on a per bed basis ranged from 64 to 98 square feet in homes not receiving Hill-Burton funds and for those using such funds from 85 to 153. This measure of living space is charted against cost per bed in chart 6, and as in the case of total area per bed, the trend value of unit cost increases in direct relation to the unit area.

Cost Per Square Foot

Square foot cost normally provides a more realistic basis for comparison, since it reflects more directly the actual construction cost and avoids the question of what constitutes a "bed." In this study, however, one-half of the owners of projects without Hill-Burton aid participated personally in some manner and to a significant extent in the construction process. Of the remaining 10, which were reportedly built by general contract, the majority were awarded on a negotiated basis. This resulted in a less than uniform pattern, making it difficult to compare costs objectively. In view of this, the square foot cost as an index of the extent and quality of the construction is less reliable than would normally be expected, but the matching relationship between unit area and square foot cost shown in chart 7 may be of interest. There is a noticeable tendency for square foot costs to rise generally with an increase in unit area per bed up to 300 square feet as shown. Beyond this the cost trend remains relatively stable for areas up to approximately 500 square feet per bed and then declines slowly. This tendency suggests that when the design stage of 500 square feet per bed has been reached the more costly built-in features have been fully included and thereafter their net influence diminishes. Beyond this level the additional square footage is essentially space itself which is devoted to improving the comfort, convenience, and freedom of movement of patients.

A summary of unit areas and costs per square foot is shown in table 7, p. 23.

Even though it was not possible to establish any degree of uniformity for features which di-

CHART 5. Cost Per Bed vs. Total Unit Area Per Bed

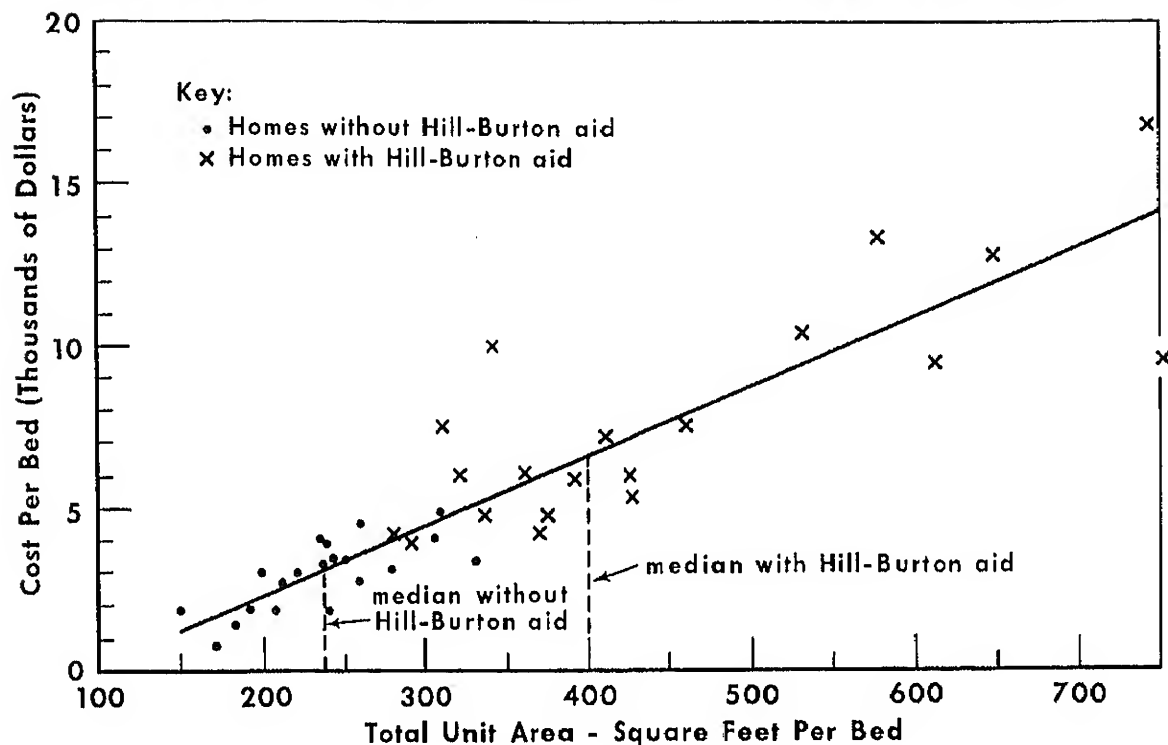


CHART 7. Cost Per Square Foot vs. Total Unit Area Per Bed

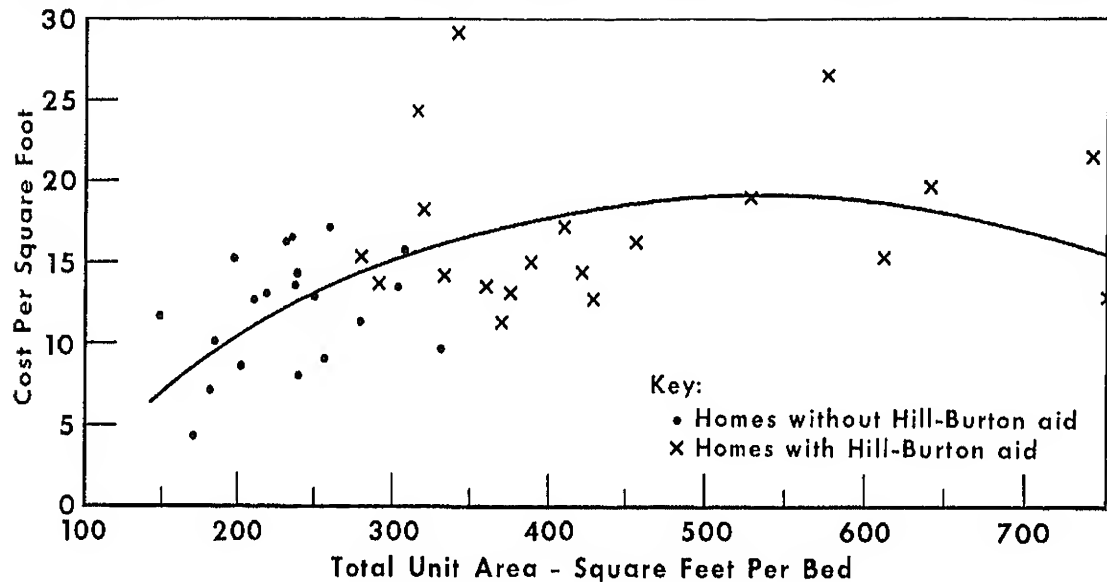
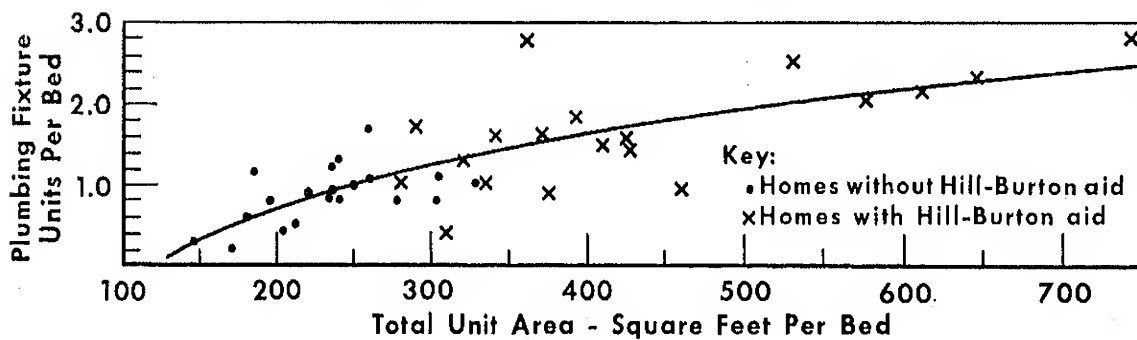


CHART 8. Plumbing Fixture Units Per Bed vs. Total Unit Area Per Bed



rectly influence costs, there appears to be less disparity than might have been anticipated. An effort was made to obtain a more valid basis for comparison by considering separately the homes without Hill-Burton aid which were reportedly built under general contractual procedures, negotiated

or competitive, similar to those followed when Hill-Burton assistance was involved. This approach reduced the variation somewhat and in the case of median costs or norms, the figures are remarkably close.

Table 7. SUMMARY OF UNIT AREAS AND CONSTRUCTION COSTS
PER SQUARE FOOT AND PER BED

Item	Total	Without Hill-Burton Aid		With Hill-Burton Aid *
		All	By General Contract	
No. of homes	40	20	10	20
Unit area (square feet per bed):				
Low	147	147	147	278
High	740	330	330	740
Median	301	236	238	400
Cost per square foot (dollars):				
Low	4.33	4.33	7.15	11.36
High	29.30	17.28	17.28	29.30
Median	13.95	12.90	15.60	15.27
Cost per bed (dollars):				
Low	736	733	1,345	3,995
High	16,840	4,750	4,750	16,840
Median	4,217	3,070	3,878	6,585

*All Hill-Burton aided projects are constructed under general contractual procedures.

Relationship of Unit Costs

Unit costs per bed and per square foot (see charts 5 and 7, pp. 21 and 22) of the homes surveyed show a measure of agreement for those built with and without Hill-Burton aid where the total unit area was comparable. A unit area of 300 square feet per bed is the approximate meeting point for the two categories. This relationship is more clearly illustrated when the upper quartile, on the basis of area, of the unaided homes and the lower quartile of those using Hill-Burton funds are considered. (See table 8.) These represent that portion of homes in each category where the range

in area is in the vicinity of the meeting point of 300 square feet per bed. As a more uniform basis for comparison, only those homes in the unaided group are listed that reportedly were constructed under contractual procedures similar to those followed when Hill-Burton aid is involved.

No inherent relationship is apparent between cost per square foot and bed capacity of a home. For any given number of beds, the unit cost per bed, as already shown, reflects the unit area provided; thus, one 50-bed home with twice as large an area per bed as another may have a marked difference in cost per bed. The governing factor

is not entirely the number of beds. If more beds are to be built for less money, the unit area must be curtailed severely or savings effected by other means such as methods of construction or use of materials.

Other Cost Factors

In addition to square foot area provided, other influential elements must be considered if a valid cost comparison is to result. One highly significant aspect was the manner in which construction work was carried out. Other typical examples might be the type and method of construction, quality of materials and workmanship, nature and extent of furnishings and equipment, as well as the price range for labor and materials in various localities. Such factors were noted, but an assessment of their relative values was beyond the scope of this study.

Methods of executing construction work permit many entirely acceptable practices to be adopted by private owners with a possible saving in cost; this latitude is somewhat restricted in the

expenditure of public funds. The most prevalent of these were owner participation in contract procedures and their individual performance in accomplishing certain phases of the construction. To be specific, owners could negotiate with a favored contracting firm for all or a portion of the work, use force account, or engage labor independently and supply the material by direct purchase. Certain owners interviewed were engaged in a full-time contracting enterprise with a permanent crew of mechanics. Their experience permitted decisions on the quality and extent of work that reflected an advantage in cost. Some owners left part of the work unfinished to be installed later as a maintenance cost. Where part of the work was performed by owners personally, members of their family, or permanent employees from other capacities, wage scales were not comparable with those prevailing in the building trades. A number of owners indicated they had obtained material and items of equipment at a cost advantage through special contacts or from salvage sources. However, some of these items were not always the most appropriate for their use, and initial appearance often belied their capacity for service.

Table 8. UNIT COSTS PER SQUARE FOOT AND PER BED FOR HOMES OF COMPARABLE UNIT AREA PER BED

Selected Homes * (Home Number)	Number of Beds	Area Per Bed (Sq. Ft.)	Cost (Dollars)	
			Per Sq. Ft.	Per Bed
Homes with Hill-Burton aid				
15	55	334	14.16	4,711
18	141	320	18.52	5,960
19	26	308	23.10	7,450
14	75	290	13.75	3,995
8	39	278	15.28	4,240
Median	55	308	15.28	4,711
Homes without Hill-Burton aid				
38	131	330	9.90	3,190
21	53	304	13.00	3,975
32	72	298	15.95	4,750
37	60	260	17.28	4,500
39	100	240	16.20	3,857
Median	72	298	15.95	3,975

* Homes comprising lower quartile of unit areas among those homes with Hill-Burton aid and upper quartile of unit areas among homes without Hill-Burton aid which followed general contractual procedures.

Quality of materials and workmanship can represent a wide range of prices and costs which would be reflected in the results of any survey of a comparative nature. The real values are difficult to assess short of a detailed analysis, but on occasions it was apparent that standards of construction, materials, finishes, and equipment were of a quality less than might be desired. Obviously this was beneficial costwise but in some instances contributed to fire hazards, a high rate of depreciation, and poor appearance. However, the majority of homes were of better quality, reflecting an increased construction cost but with consequent advantages.

Mechanical and electrical systems represent a major portion of cost in facilities of this nature. Variations in the type of system, choice of materials, class of workmanship, and quality and number of fixtures and outlets reflect appreciable cost differences. Findings on one element in this category, the quantity of plumbing fixtures, are shown in chart 8, p. 22. Homes in the lower range of areas had fewer fixture units per bed with a saving in cost but frequently at the expense of patient care and convenience. Similar examples of cost economy in mechanical and electrical systems could be cited.

Assessment of Cost Findings

From this survey it appears that two basic factors significantly influence cost differences which arise on construction work accomplished with and without Hill-Burton aid. These are contractual procedures and amount of space provided. To a lesser extent, quality of the product and

jurisdictional requirements may also contribute to a cost differential. In respect to contractual procedures, projects involving Hill-Burton funds must follow certain practices generally accepted as normal in construction work. Where these practices were followed by homes without Hill-Burton aid, there was no marked difference in the median cost per square foot from those receiving such assistance. On the question of space, which is quite important in long-term care facilities, it is readily understood that fewer square feet in a building will result in lower overall costs. Some jurisdictional regulations permit areas, as well as other features, which are admittedly less than desirable. In such cases, if a private owner wishes merely to satisfy minimum requirements, it may be possible for him to build at a lower cost per bed or per square foot. Such requirements often influence architectural planning and may be reflected in construction costs. On a realistic basis, when the broad aspect of patient care is considered, the regulations governing Hill-Burton aid are widely regarded as basically minimum. They will permit low cost construction if the sponsor chooses to limit the extent to which they are exceeded. There is, however, no restriction should an owner elect higher standards in the interest of improved patient care or for other appropriate reasons. To a large extent, costs are controlled by the owner or sponsor, and it must be recognized that the privately-owned home is permitted more latitude in effecting compromises and employing certain practices to reduce cost, whether or not it seriously affects patient care. In short, any valid comparison of costs must consider the given set of conditions and a fair appraisal of exactly what is being purchased.

SUMMARY

A study at the operational level of 40 nursing homes has given an insight into the design and use of the modern nursing home. Twenty of the homes were suggested by the American Nursing Home Association based on the following criteria: (1) recent construction; (2) at least one year of operation; (3) wide geographic distribution; and (4) proprietary ownership and private financing. An additional 20 homes in the nonprofit category, which had received Hill-Burton aid for construction, were selected by the Public Health Service to match as nearly as possible the American Nursing Home Association criteria. This balance was arrived at to examine on an equivalent

basis any material differences in the two categories. The homes surveyed were diverse in size, ownership, and geographic location. They included a total of 2,434 beds and approximately 2,200 patients.

A consistently high occupancy rate was found in the homes studied, the median being 96 percent. The median length of stay for persons in residence at the time of visit was approximately 12 months. This contrasted with a median stay of 2 months for all persons discharged during the previous year.

The median rate of staffing was 52 employees per 100 beds, the majority of the staff being nursing personnel. By level of training, medians were found to be 4.1 per 100 beds for registered nurses, 2.5 for licensed practical nurses, and 30 for all other nursing personnel.

The study showed that the number of female patients in the median home was twice that of males and that the median age was 79 years. Over 80 percent of the patients were mobile to some degree; wheelchair patients were counted in this number. One-fourth of all the patients in the homes surveyed were reported as confined to wheelchairs.

The majority of the homes visited were of one-story masonry construction of contemporary design, informal and domestic in character. However, there was wide variation in interior design as to space, furnishings, and equipment. The most striking difference was in the total square feet per bed which ranged from 147 to 740. Homes built with Hill-Burton assistance had a median area per bed of 400 square feet. For those not receiving such aid, the median was 236 square feet. As an aid to patient morale there is increased emphasis on creating a homelike atmosphere with spacious and cheerful interiors, but in a few homes the environment appeared dismal and depressing.

Specific design weaknesses noted in some of the homes were lack of facilities for occupational and physical therapy, inconvenient bathing and toilet facilities, lack of proper separation of functional areas, insufficient space in kitchen and dishwashing areas, lack of central dining and recreation areas, unsatisfactory utility rooms and janitor facilities, and poor ventilation.

Construction costs were difficult to analyze because precise information was sometimes lacking and some owners participated directly in construction work without full contractual procedures. However, the pattern in square-foot costs appeared relatively stable for homes within the range of 300 to 500 square feet per bed.

The median cost for the 20 homes without Hill-Burton aid was \$12.90 per square foot and for those receiving such assistance, \$15.27. No material difference in cost per square foot appears between the Hill-Burton aided and unaided groups when account is taken of only those homes without this Federal aid which followed full contractual procedures.

In evaluating cost per bed, the total square feet of area provided per bed is a highly significant factor. The differential in cost per bed between Hill-Burton aided homes and those unaided homes with full contractual procedures was found to be quite limited when homes of comparable unit areas per bed were compared. The median cost for five homes with Hill-Burton aid having a unit area of about 300 square feet per bed was \$4,700 as compared with about \$4,000 for five homes of similar area without Hill-Burton aid. The cost corresponding to the general trend pattern (trend cost) was \$3,125 per bed at the median size of 236 square feet per bed for the 20 homes built without Hill-Burton aid. At the median size of 400 square feet per bed in the 20 homes built with Hill-Burton aid the trend cost was about \$6,500 per bed.

The effectiveness of patient care and rehabilitation appears to be related to the adequacy of space and physical facilities for these services as well as staffing patterns. The noticeable trend of increasing the total area per bed indicated such substantial benefits, documented by this study, as improved patient service, more active therapy programs, and increased livability of quarters. These advantages accompanied, and would appear to justify, such additional costs as may result from increased space. In contrast, homes with low square foot area per bed were restricted in certain major functional areas such as central dining and dietary, recreation, occupational and physical therapy, space in patient rooms, and utility and treatment facilities for nursing service. Less than one-half of the homes had some degree of occupational or physical therapy service, but there is increasing interest in this phase of restorative care. To provide space for these activities and create a more livable environment, the Hill-Burton program established the requirement of 50 square feet for 75 percent of the beds (37.5 square feet per bed for all beds) for dining, recreation, and occupational therapy. This survey indicated that the proportion of mobile patients was in excess of 75 percent. It was also found that many homes built with Hill-Burton aid had chosen to exceed this requirement since the median unit area for these functions was greater by about 30 percent. These facts appear to confirm the validity of the space requirements.

This limited study provides substantial evidence that enlightened philosophy is promoting improved practice in the design and use of many nursing homes.

Hill-Burton Publications

An annotated bibliography, "Hill-Burton Publications," Public Health Service Publication No. 930-G-3, will be provided upon request. For a free single copy write to:

Division of Hospital and Medical Facilities
Public Health Service
U.S. Department of Health, Education, and Welfare
Washington, D.C. 20201

The bibliography presents a brief description of each of the publications from the Hospital and Medical Facilities Series under the Hill-Burton Program. They are listed by category as shown below:

- A -- Regulations
- B -- Community Planning
- C -- Organization and Administration
- D -- Design and Equipment
- E -- Research and Demonstration
- F -- Reports and Analyses
- G -- Bibliography

Publications must be ordered by their complete title and publication number rather than by category.